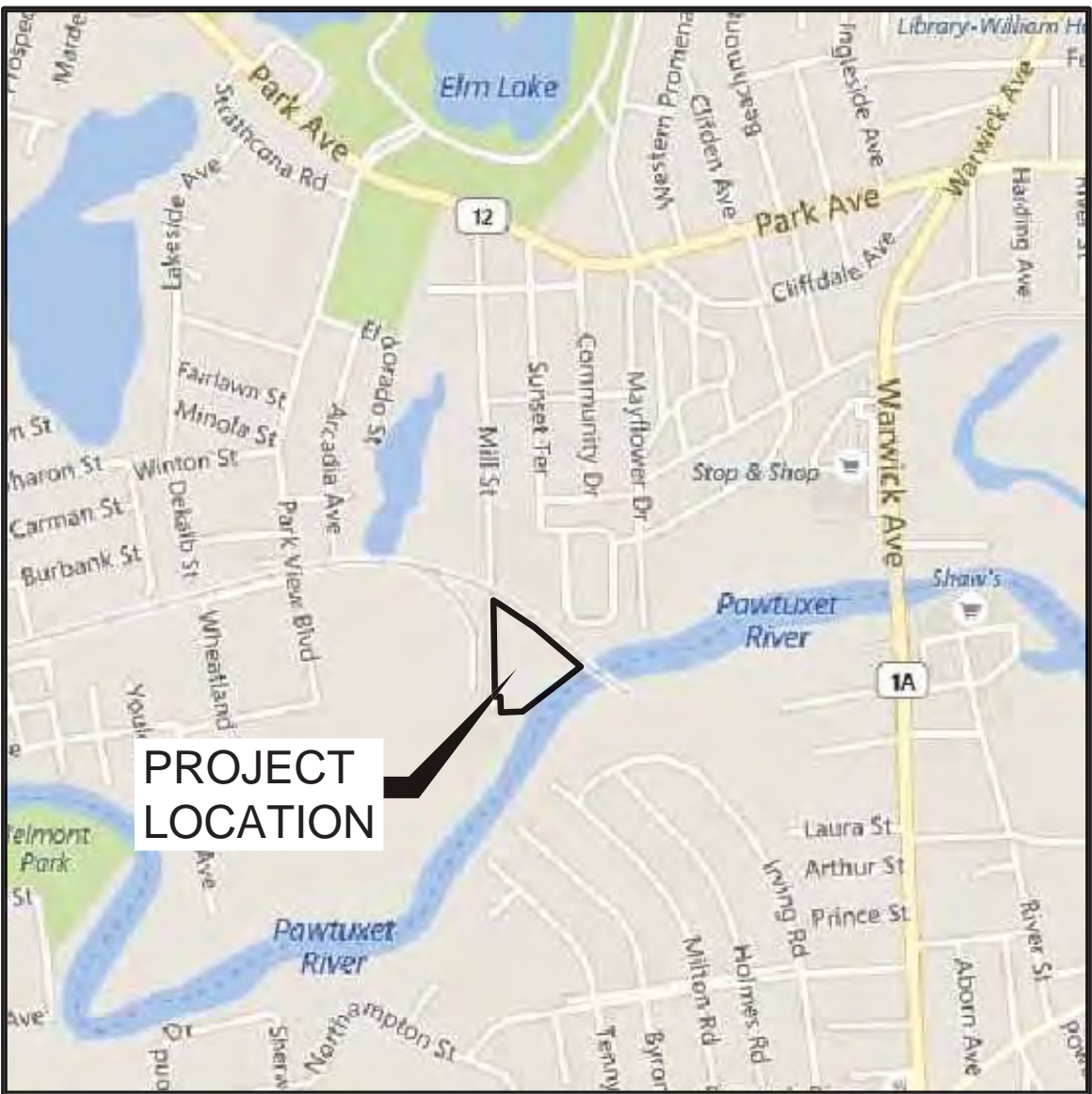


APPENDIX E

FINAL REMEDIAL DESIGN

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C-2	SITE AND SURVEY PLAN
C-3	GENERAL SITE PLAN
C-4	REMEDIAL EXCAVATION PLAN
C-5	EXCAVATION LOCATION PLAN
C-6	CLEAN SOIL COVER PLAN
C-7	FINAL GRADING PLAN
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L-1	PLANTING PLAN - PHASE 1
L-2	PLANT DETAILS, NOTES, & SCHEDULE
L1-A	PLANTING PLAN ALT - PHASE 1
L2-A	PLANT DETAILS, NOTES, & SCHEDULE (ALT.)
L-3	SITE DETAILS
L-4	SITE DETAILS



LOCUS MAP
NOT TO SCALE

BASF CORPORATION
FORMER CIBA-GEIGY FACILITY
180 MILL STREET
CRANSTON, RHODE ISLAND

REMEDIATION AND RESTORATION OF PLAT 4 LOT 1102



SUBMISSION
SEPTEMBER 1, 2017

REVISED SUBMISSION
NOVEMBER 28, 2017

REVISED SUBMISSION
FEBRUARY 22, 2018

REVISED SUBMISSION
MAY 13, 2019

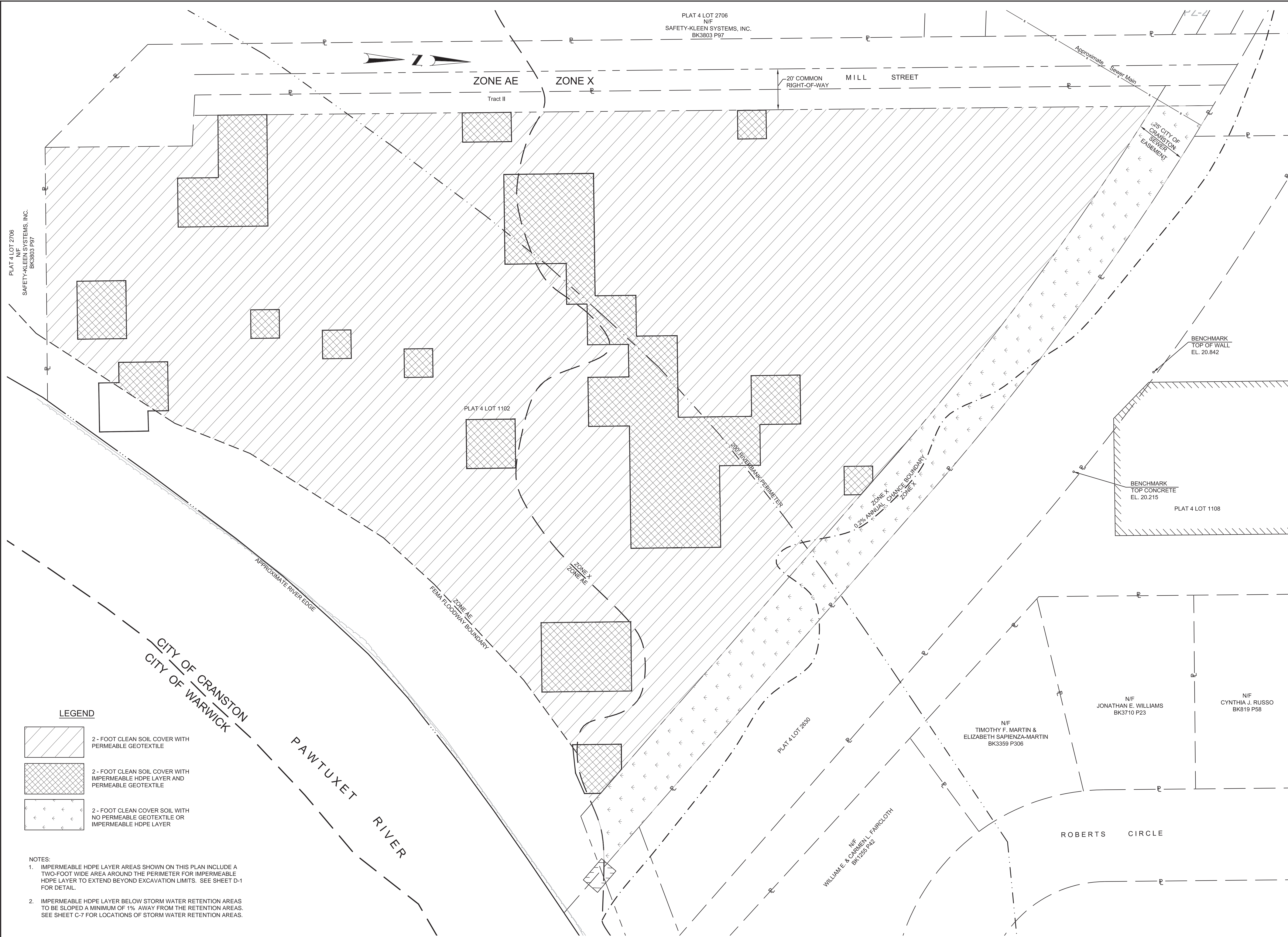


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Civil and Environmental Engineers
Pawtucket, Rhode Island



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BOSTON, MA 02109

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Pawtucket, Rhode Island

DRAWING TITLE		REVISIONS		BY	
CLEAN SOIL COVER PLAN		NO.	DATE	11/28/17	SHEET REVISED PER COMMENTS
		1	11/28/17		SHEET REVISED PER COMMENTS
		2	2/22/18		REVISE PER EPA COMMENTS

PROJECT NO.: 1701

DATE: SEPTEMBER 1, 2017

SCALE: 1" = 20'

DRAWN BY: LBD

CHECKED BY: SPC

DRAWING NUMBER
C-6
SHEET 7 OF 17



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DRAWING TITLE			
FINAL GRADING PLAN			
NO.	DATE	REVISIONS	BY
1	11/28/17	SHEET REVISED PER COMMENTS	
2	4/18/19	REVISED GRADING	
3	5/02/19	REVISED FINAL GRADING AND LIMIT OF DISTURBANCE	

PROJECT NO.: 1701

DATE: SEPTEMBER 1, 2017

SCALE: 1" = 20'

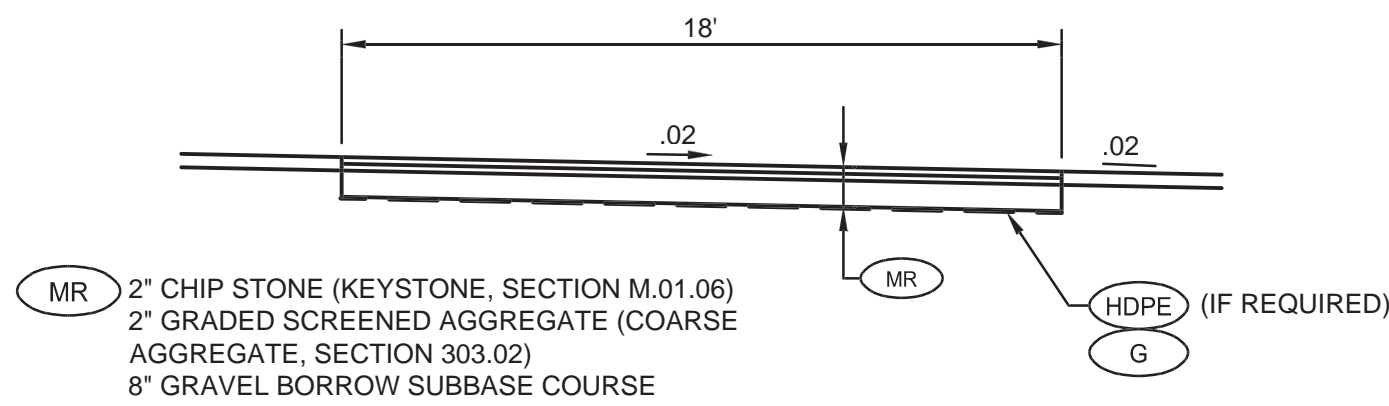
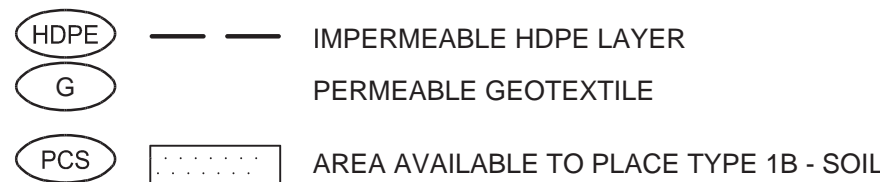
DRAWN BY: LBD

CHECKED BY: SPC

DRAWING NUMBER
RC-7
SHEET 1 OF X

P:\FILES\CAD\701\Highway_Plan\2017\SOOTH\701 SOUTH DETAILS.dwg 2/22/2018 9:13:28 AM USER47

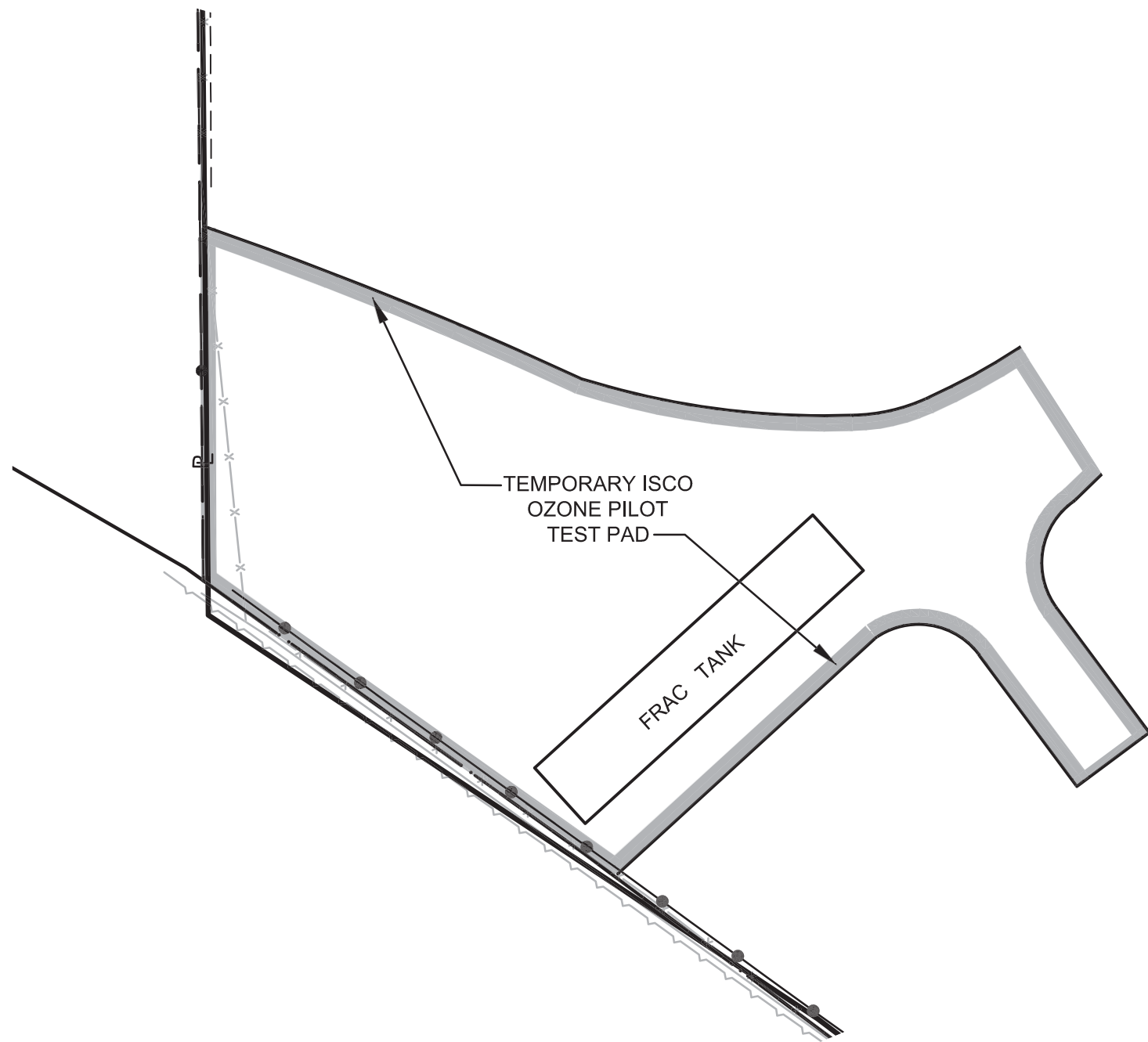
NON-COMPLIANT SOIL MANAGEMENT LEGEND



TEMPORARY GRAVEL ACCESS ROAD AND ISCO OZONE PILOT TEST PAD

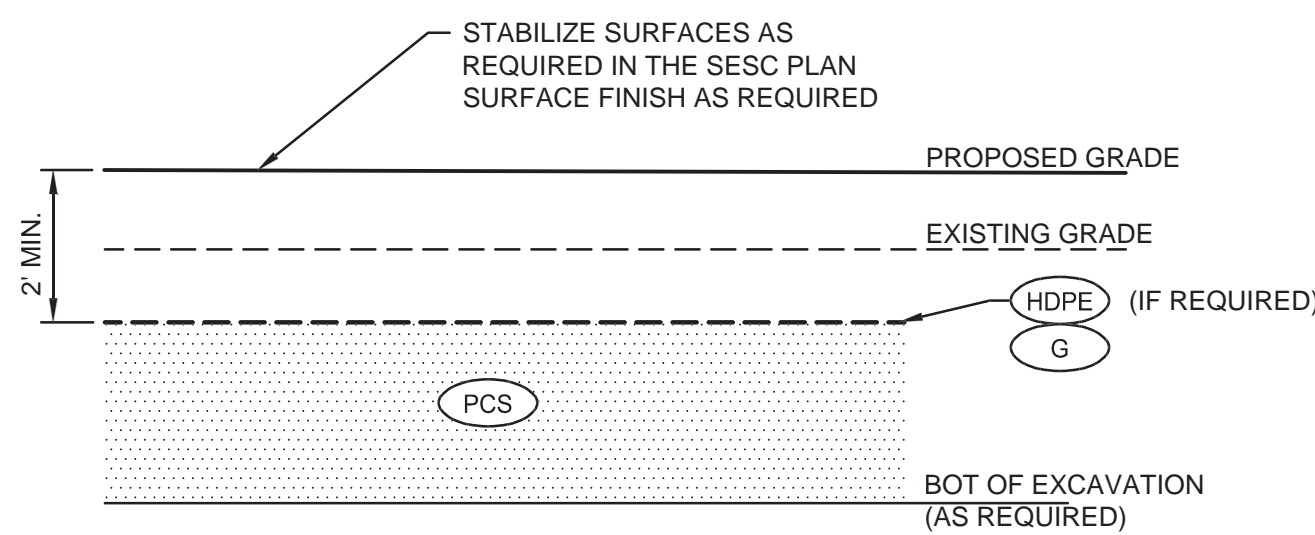
NOT TO SCALE

NOTE:
SEE SPECIFICATIONS FOR PERMEABLE GEOTEXTILE
AND IMPERMEABLE HDPE LAYER REQUIREMENTS.



ISCO OZONE PILOT TEST PAD

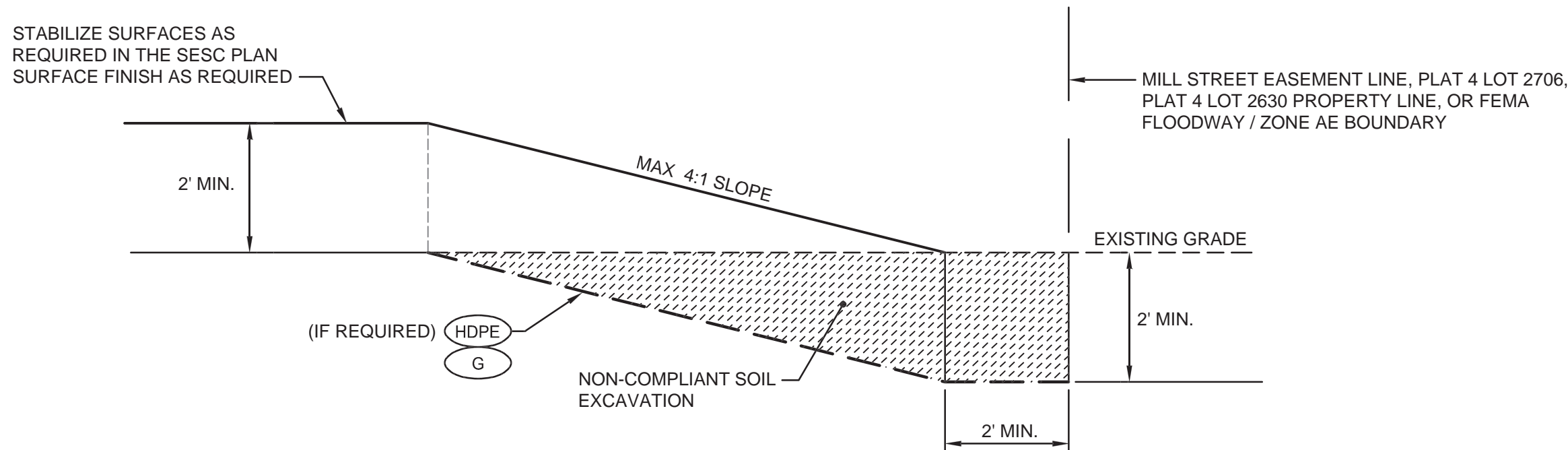
SCALE: 1" = 20'



AREA OF NON-COMPLIANT EXCAVATION

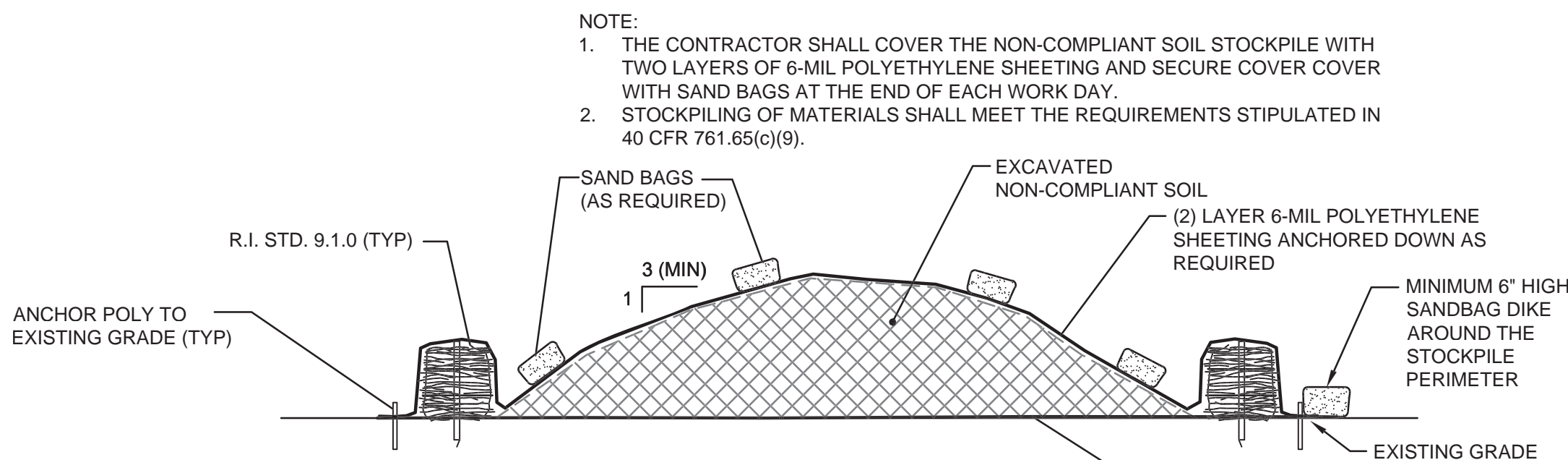
NOT TO SCALE

NOTE:
SEE SPECIFICATIONS FOR PERMEABLE GEOTEXTILE
AND IMPERMEABLE HDPE LAYER REQUIREMENTS.



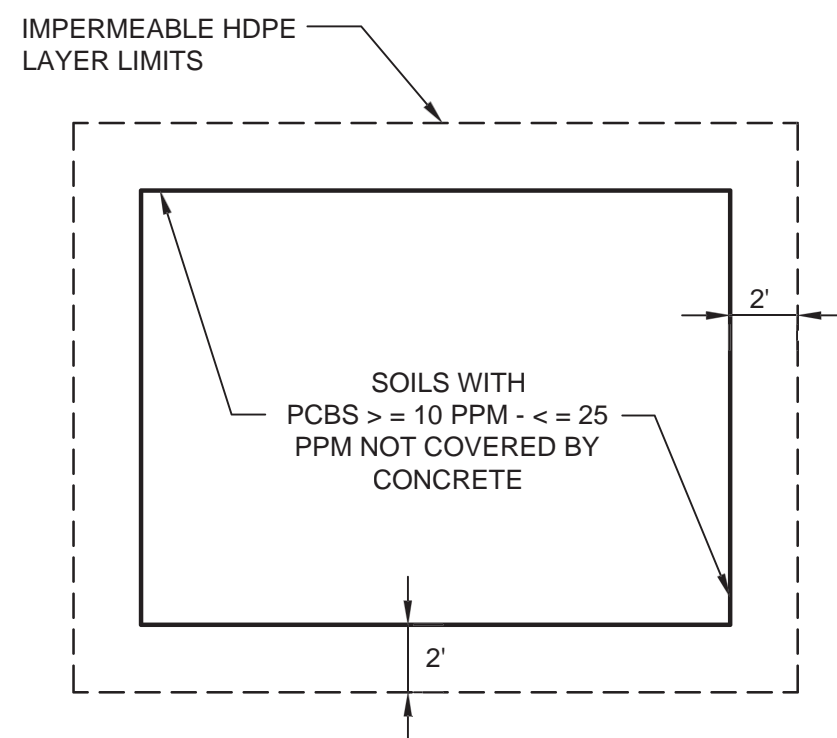
TYPICAL 2-FOOT CLEAN SOIL COVER AND LOT BOUNDARY EXCAVATION WEDGE

NOT TO SCALE



SECTION THROUGH
NON-COMPLIANT SOIL STOCKPILE

NOT TO SCALE



NOTE:
SEE SPECIFICATIONS FOR
IMPERMEABLE HDPE LAYER
REQUIREMENTS.

IMPERMEABLE HDPE LAYER INSTALLATION DETAIL

NOT TO SCALE

ISCO OZONE PILOT TEST PAD NOTE:

1. INSTALL ALL EROSION CONTROLS IN ACCORDANCE WITH SOIL EROSION AND SEDIMENT CONTROL (SESC) PLAN. CLEAR AND GRUB AREA AS INDICATED ON THE CONTRACT DRAWINGS.
2. PROTECT, EXTEND AND/OR REMOVE MONITORING WELLS AS INDICATED AND IN ACCORDANCE WITH CONTRACT DRAWINGS, PLAN C-1.
3. PREPARE TEMPORARY PAD FOR FRACTIONATION TANK (GROUNDWATER EXPECTED DURING EXCAVATION OF NON-COMPLIANT SOILS). DEWATERING FLUIDS TO BE MANAGED IN ACCORDANCE WITH RIDEM REMEDIATION AND TSCA REGULATIONS.
4. EXCAVATE NON-COMPLIANT AND LOT BOUNDARY EXCAVATION WEDGE SOILS AND PLACE INTO DESIGNATED STOCKPILE AREA.
5. RESIDENT ENGINEER TO COLLECT POST EXCAVATION SAMPLES.
6. UPON RECEIPT OF COMPLIANT POST EXCAVATION DATA FROM RESIDENT ENGINEER, BACKFILL EXCAVATIONS TO FINAL SUBGRADE WITH APPROVED IMPORTED MATERIAL OR COMPLIANT ON-SITE FILL MATERIAL.
7. MARK OUT LIMITS OF PAD AS SHOWN ON CONTRACT DRAWINGS.
8. INSTALL ANY IMPERMEABLE HDPE LAYER / PERMEABLE GEOTEXTILE IN AREA OF PAD AS INDICATED ON PLAN C-6.
9. INSTALL PAD, AS INDICATED BY DETAILS SHOWN ON THIS SHEET. MATERIALS SHALL MEET THOSE REQUIREMENTS AS STIPULATED IN THE CONTRACT SPECIFICATIONS.
10. COMPACTION SHALL BE COMPLETED BY ROLLING EXCAVATOR OR UTILIZING COMPACTION EQUIPMENT TO ACHIEVE 95% PROCTOR.
11. AT THE CONCLUSION OF THE PILOT TEST THE PILOT TEST PAD MATERIAL LOCATED IN THE FLOODWAY SHALL BE REMOVED AND DISPOSED IN ACCORDANCE WITH RIDEM HAZARDOUS WASTE / SOLID WASTE / UNIVERSAL WASTE AND TSCA REGULATIONS.
12. AT THE CONCLUSION OF THE PILOT TEST THE PILOT TEST PAD MATERIAL LOCATED IN ZONE AE SHALL REMAIN IN PLACE.

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DRAWING TITLE
DETAILS 1

NO.	DATE	REVISIONS	BY
1	11/28/17	SHEET REVISED PER COMMENTS	
2	2/22/18	REVISE PER EPA COMMENTS	

PROJECT NO.: 1701

DATE: SEPTEMBER 1, 2017

SCALE: NONE

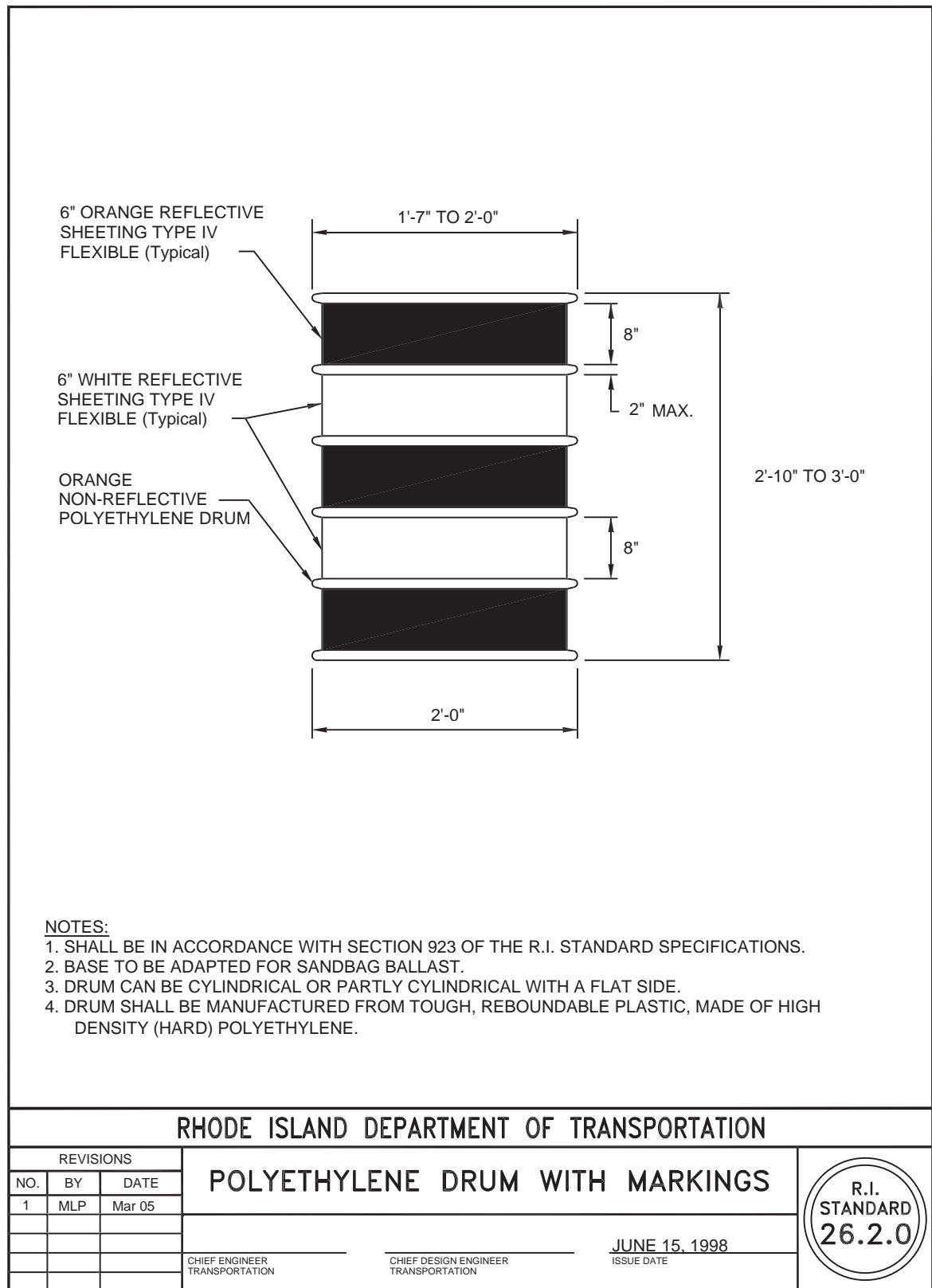
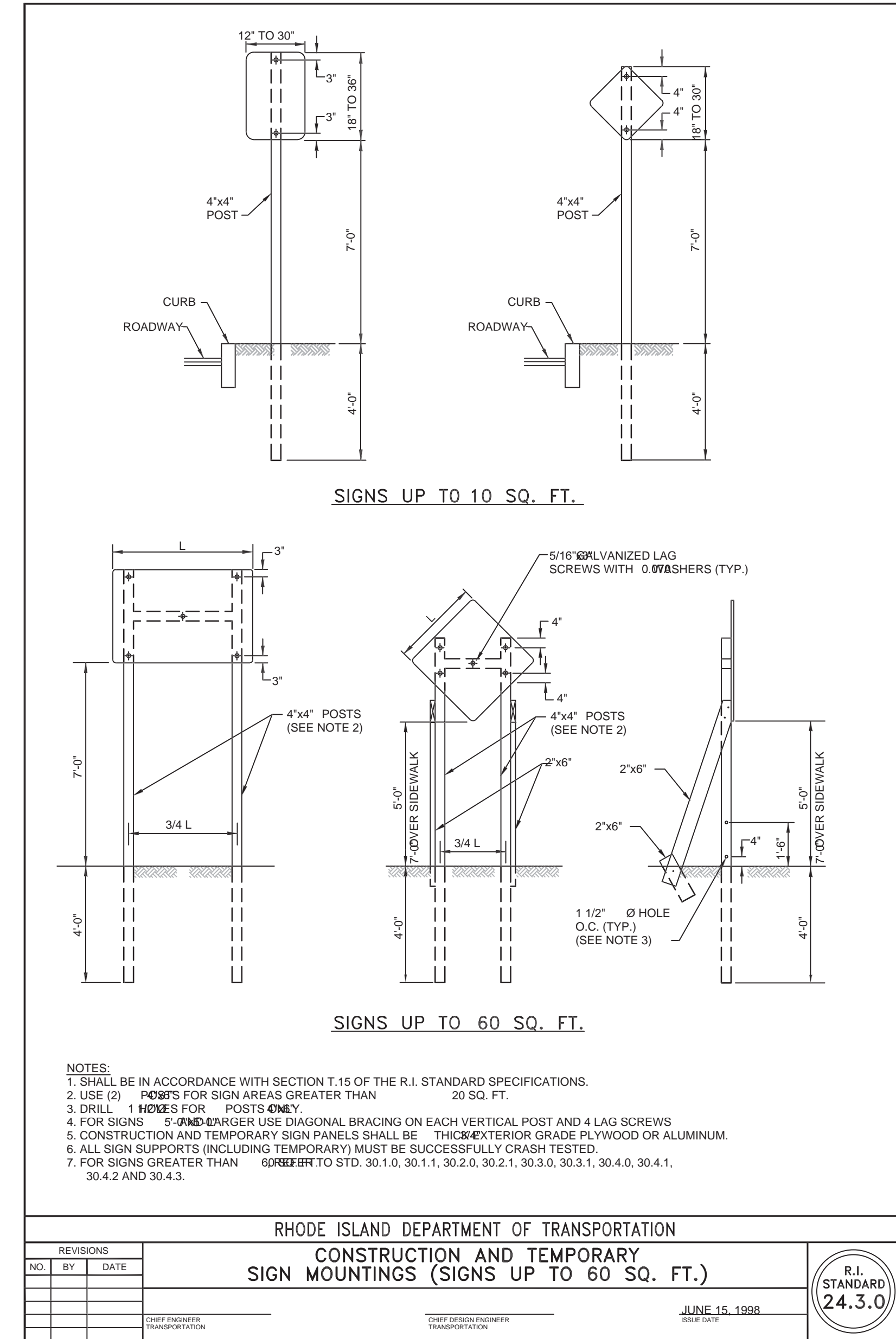
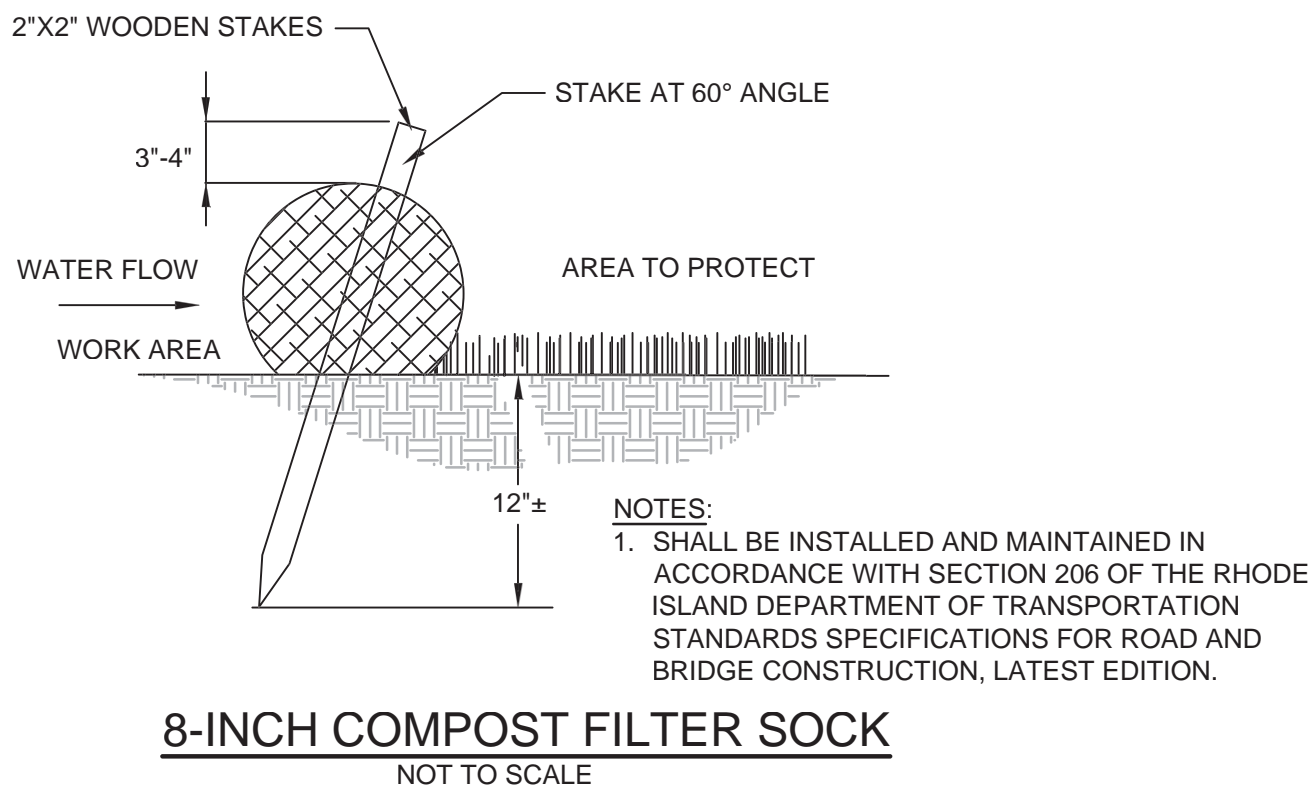
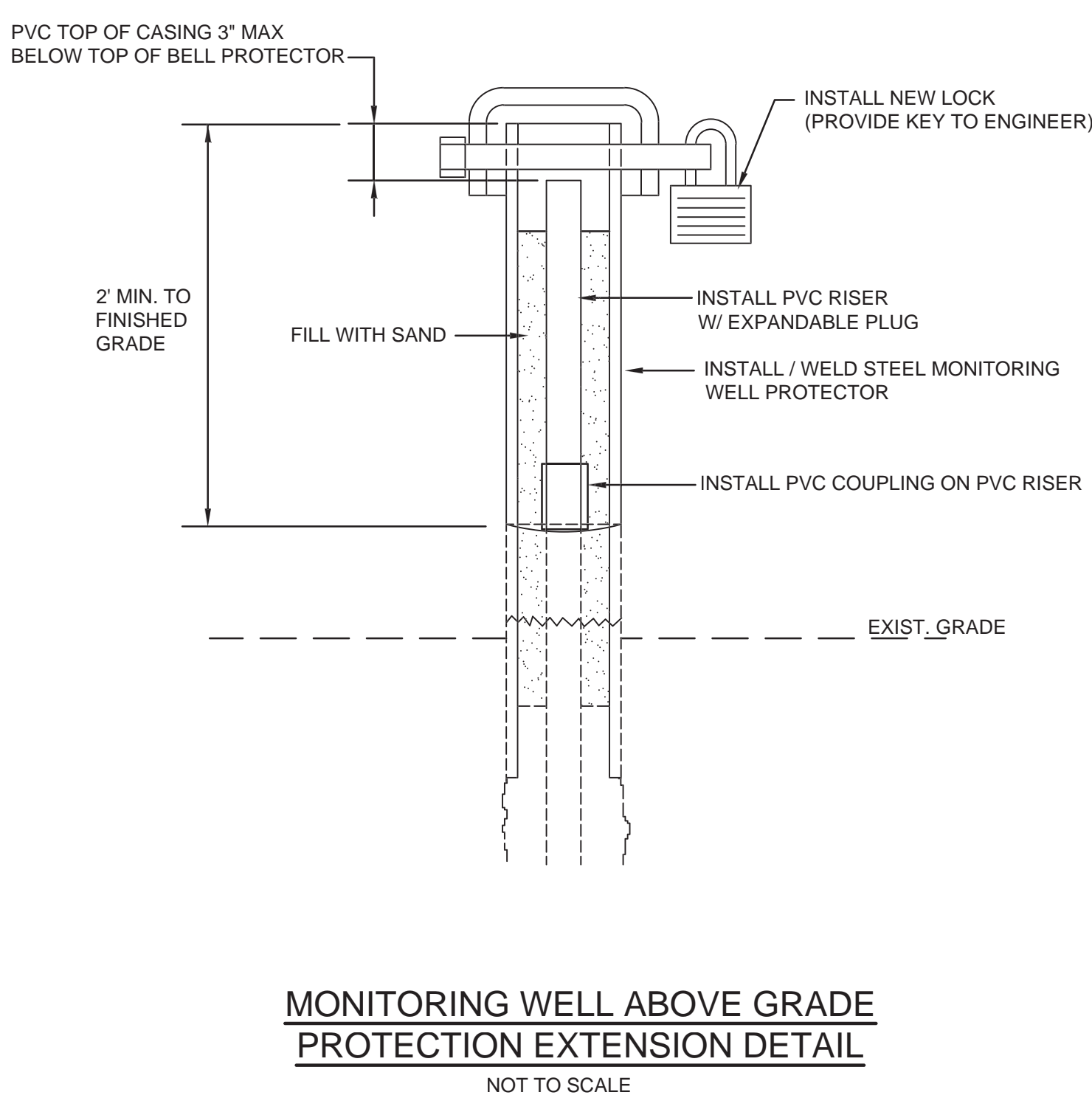
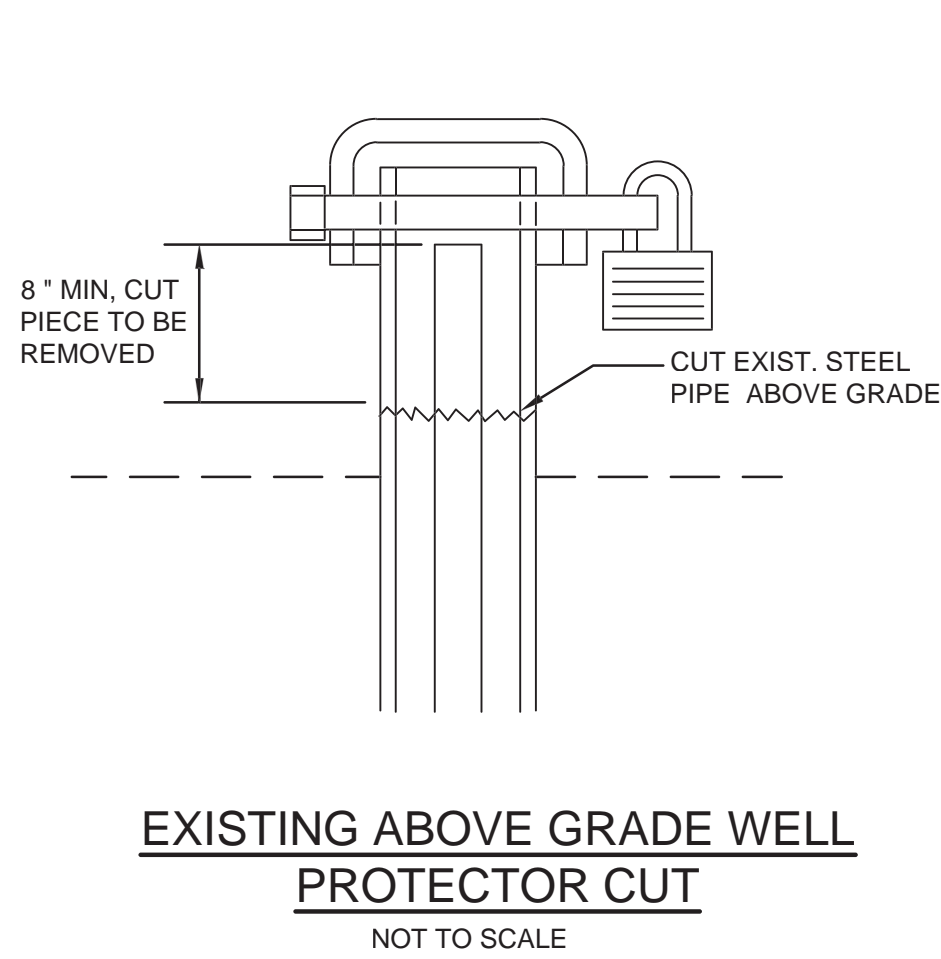
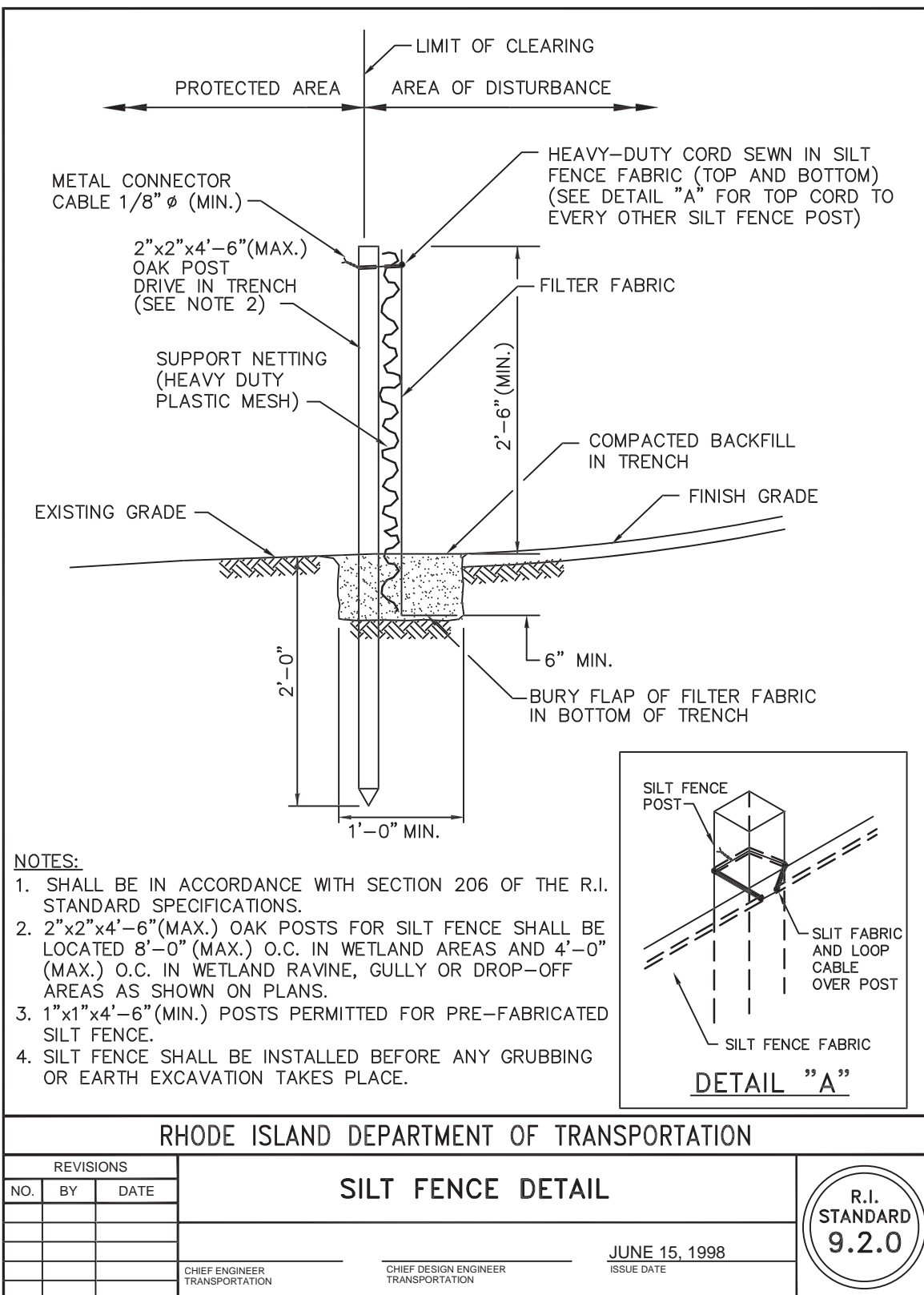
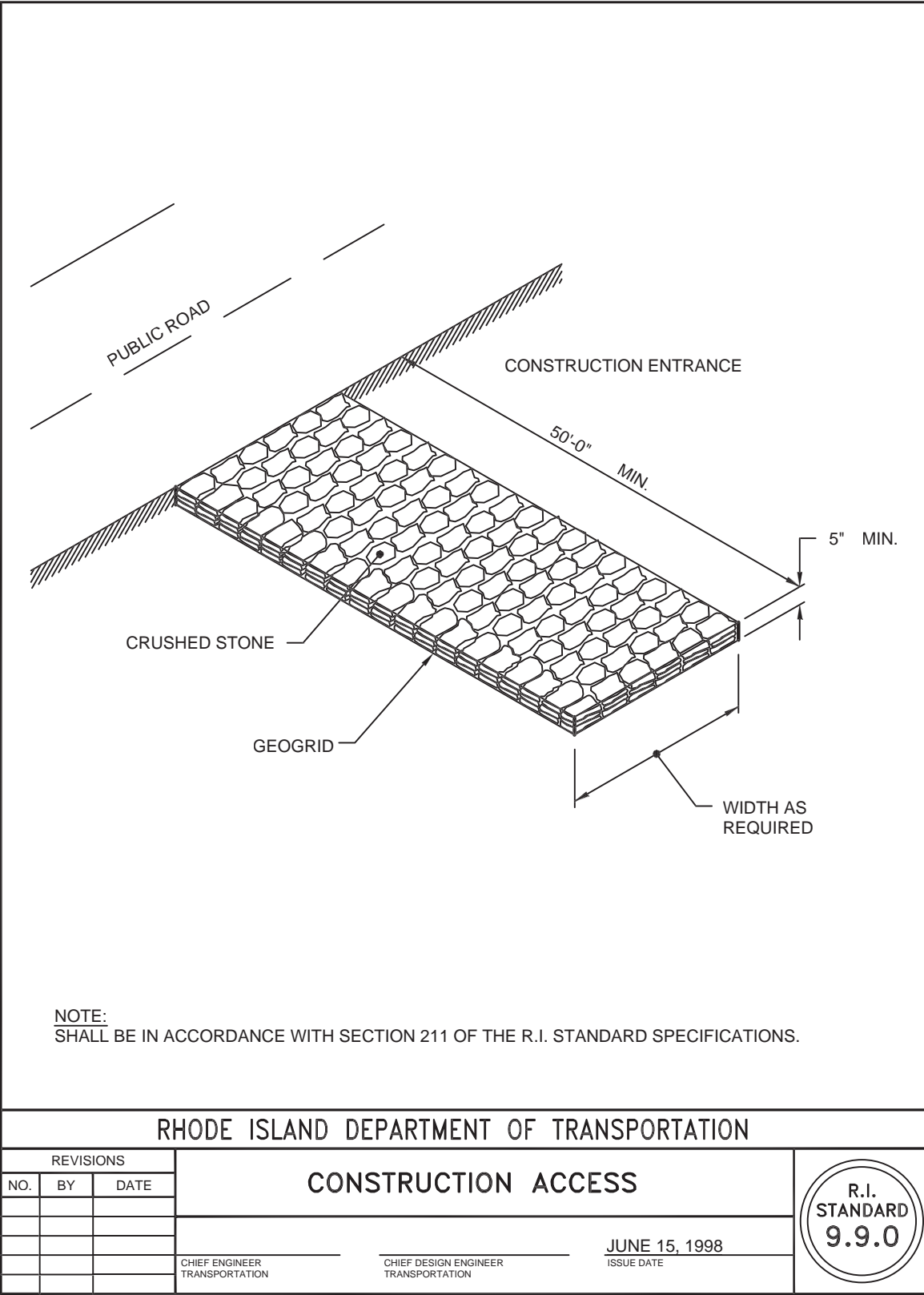
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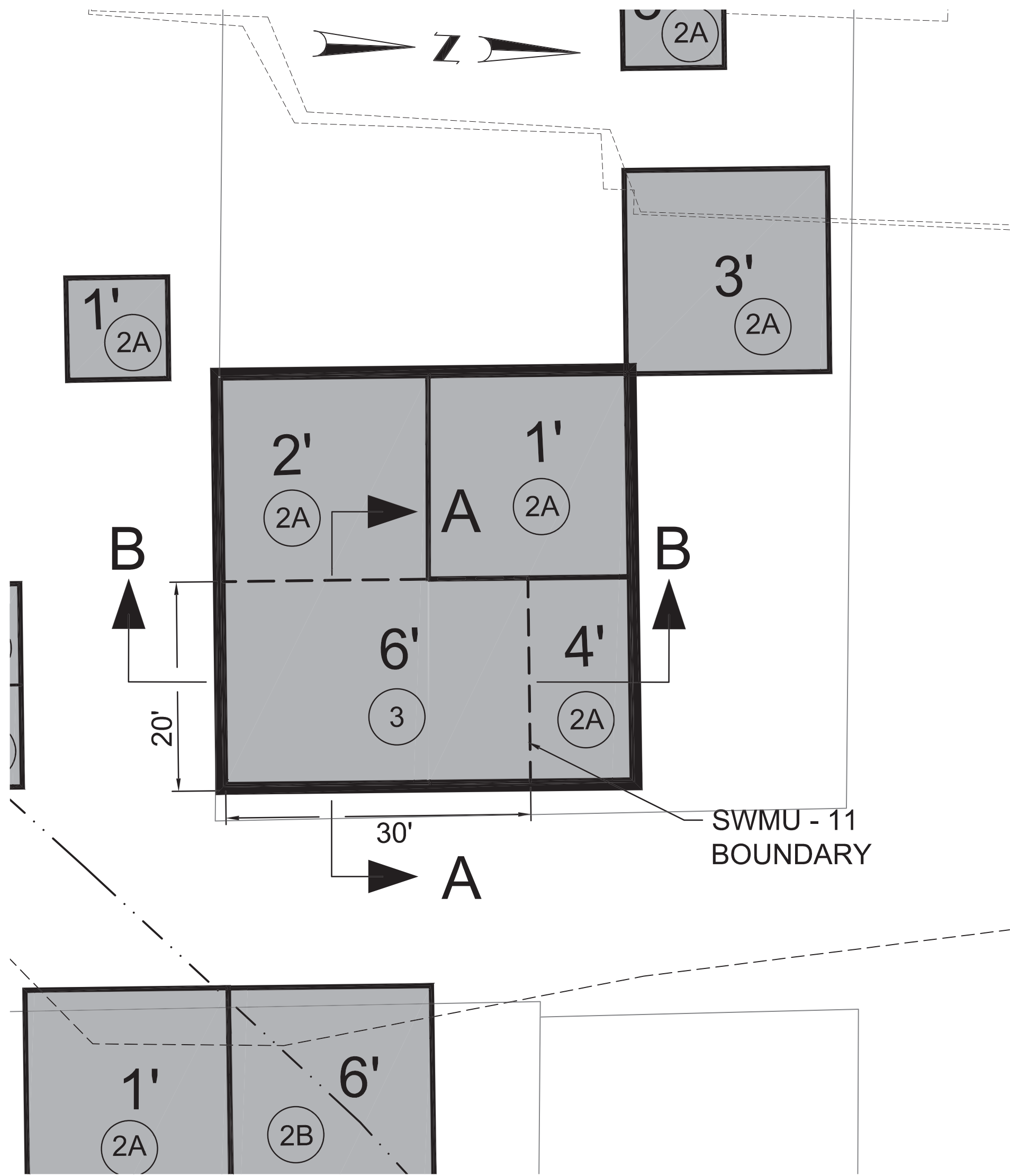
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DRAWING NUMBER

D-1

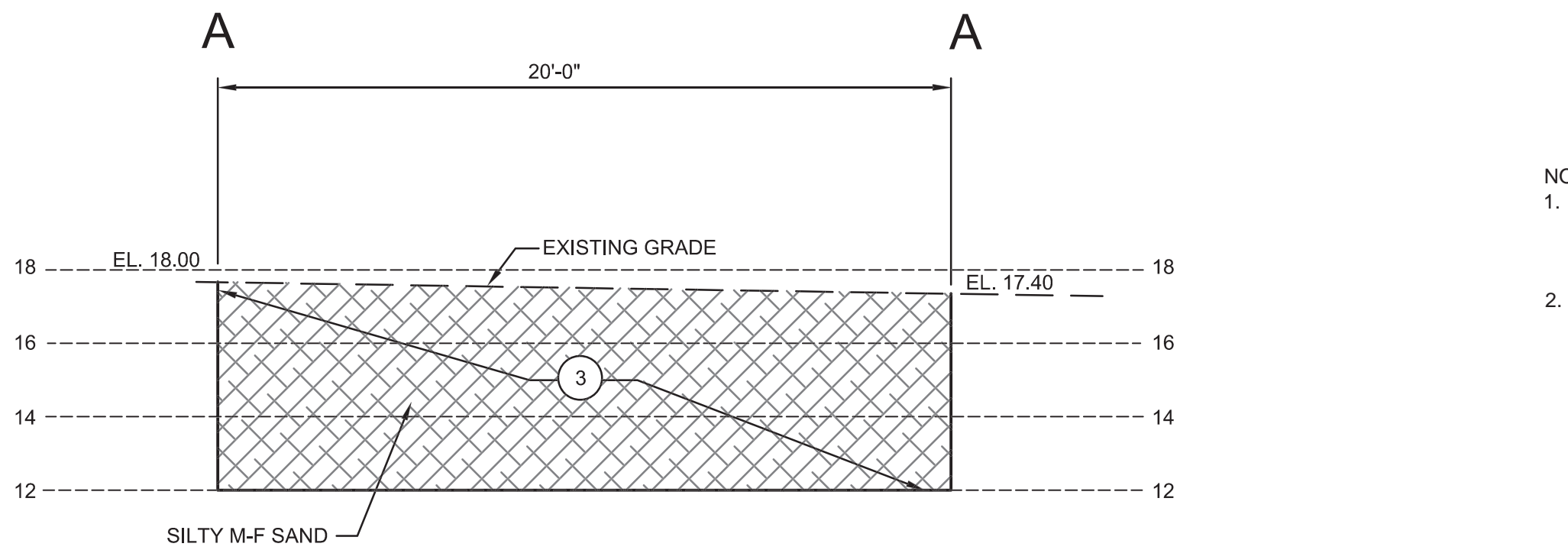
SHEET 9 OF 17



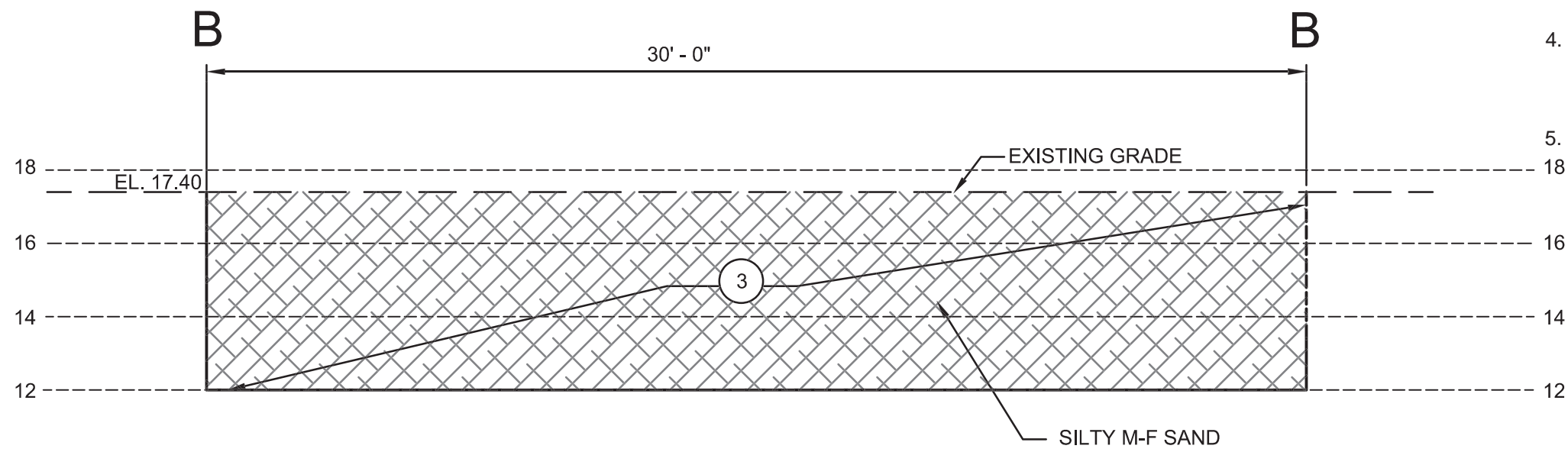


SWMU - 11 EXCAVATION PLAN
SCALE: 1" = 10'

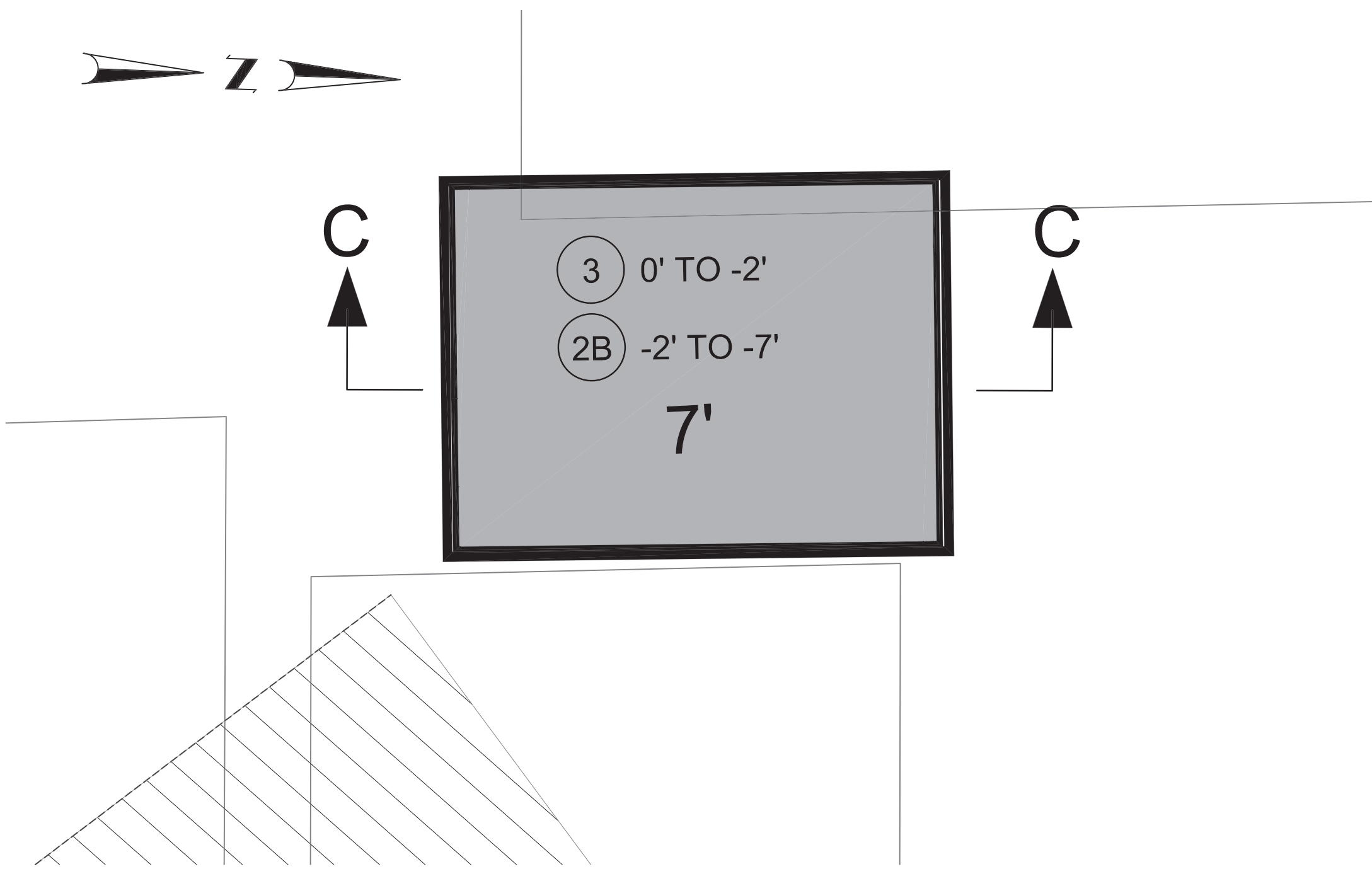
SOIL TYPE LEGEND	
1A	< RES DEC
1B	RCRA NON-HAZARDOUS PCBS < 10 PPM
1C	RCRA NON-HAZARDOUS PCBS > 10 PPM - < 25 PPM
2A	RCRA NON-HAZARDOUS PCBS > 25 PPM - < 50 PPM
2B	RCRA NON-HAZARDOUS PCBS > 50 PPM - < 100 PPM
2C	RCRA NON-HAZARDOUS PCBS > 100 PPM
3	RCRA HAZARDOUS



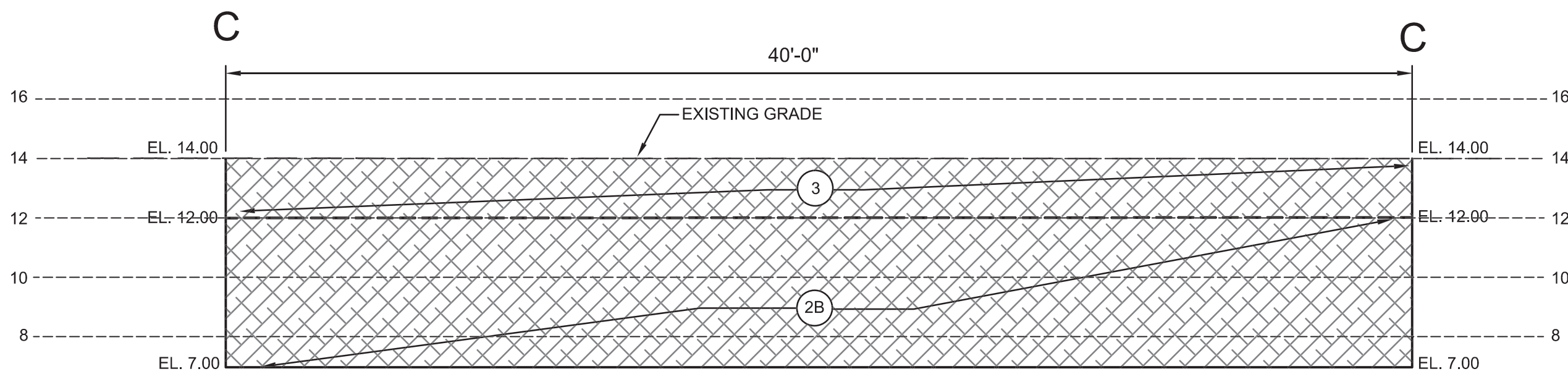
SECTION A - A
SCALE: 1" = 4'



SECTION B - B
SCALE: 1" = 4'



SWMU - 8 EXCAVATION PLAN
SCALE: 1" = 10'



SECTION C - C
SCALE: 1" = 4'

- NOTES:
1. COMPLETE SWMU-11 EXCAVATION PRIOR TO SURROUNDING RCRA NON-HAZARDOUS PCB NON-COMPLIANT SOIL EXCAVATIONS.
 2. EXCAVATION TO PROCEED TO DEPTH SHOWN ON PLAN OR GROUNDWATER TABLE, WHICHEVER IS DEEPER. THE CONTRACTOR MAY SEPARATE THE SWMU-11 EXCAVATION AREA INTO FOUR (OR MORE) SEPARATE QUADRANTS. AS PROPOSED, EACH QUADRANT CAN BE EXCAVATED TO THE TARGET DEPTH, THEN THE SATURATED ZONE SOILS MECHANICALLY MIXED, AS DESCRIBED IN NOTE 3, WITH THE CHEMICAL OXIDANT BEFORE MOVING TO THE NEXT QUADRANT. THE CONTRACTOR SHALL PROPOSE THE MEANS AND METHODS TO PROPERLY EXCAVATE AND TREAT SWMU-11 AREA TO THE RESIDENT ENGINEER FOR REVIEW AND APPROVAL PRIOR TO IMPLEMENTING THIS PHASE OF WORK.
 3. UPON ACHIEVING EXCAVATION DEPTH OR ENCOUNTERING GROUNDWATER BEGIN MECHANICAL MIXING OF 5-7% CATALYZED SODIUM PERSULFATE OR EQUIVALENT INTO SATURATED ZONE. MIXING SHALL OCCUR AT A MINIMUM 2-FEET INTO SAT. ZONE.
 4. RESIDENT ENGINEER TO COLLECT POST EXCAVATION SIDE WALL SAMPLES PRIOR TO BACKFILL OPERATIONS OR ADDITIONAL ADJACENT EXCAVATIONS
 5. UPON RECEIPT OF COMPLIANT POST EXCAVATION DATA THE CONTRACTOR MAY BEGIN BACKFILL OR EXCAVATION OF RCRA NON-HAZARDOUS PCB NON-COMPLIANT SOILS FROM ADJACENT EXCAVATIONS.

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DRAWING TITLE
DETAILS 3

NO.	DATE	REVISIONS		BY
		SHEET	REVISED PER COMMENTS	
1	11/28/17			

PROJECT NO.: 1701

DATE: SEPTEMBER 1, 2017

SCALE: NONE

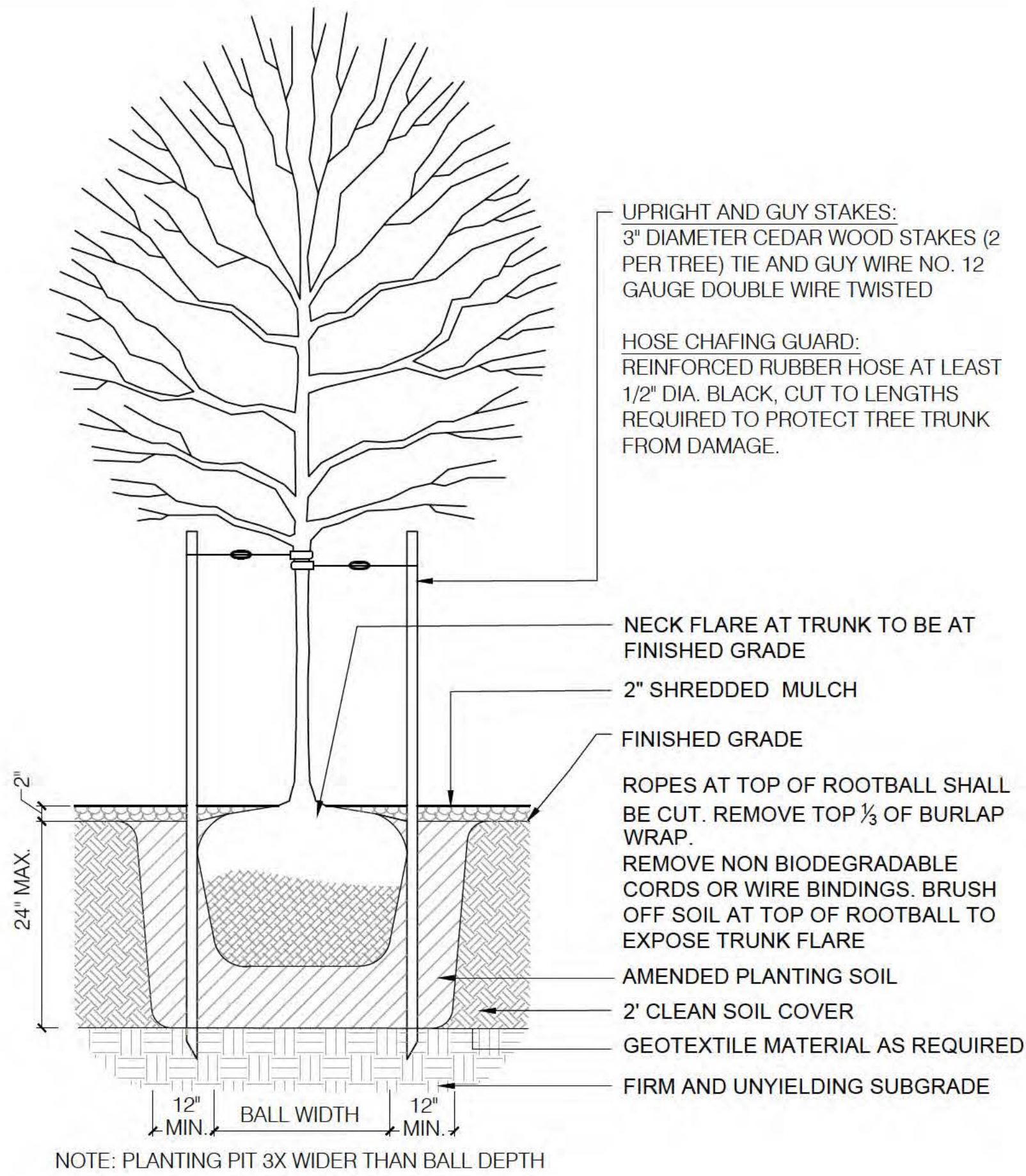
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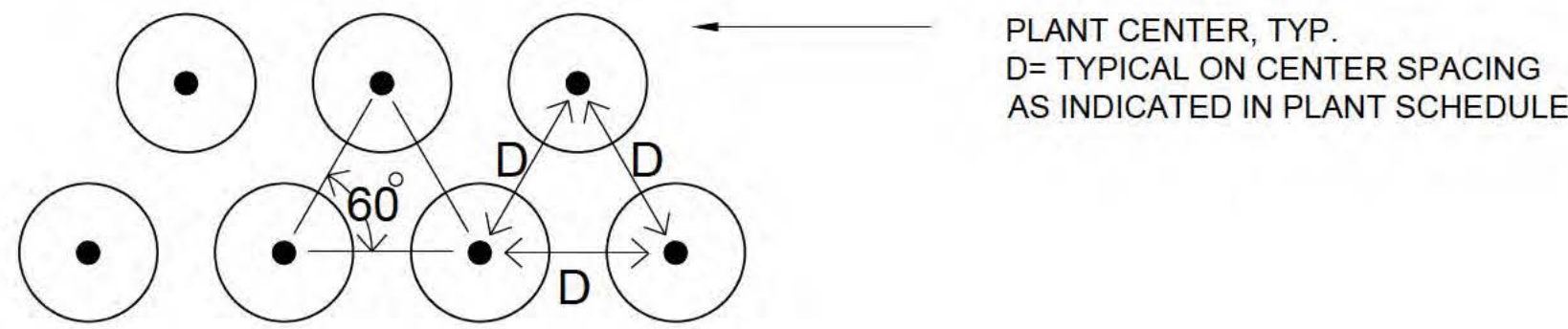
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D-3

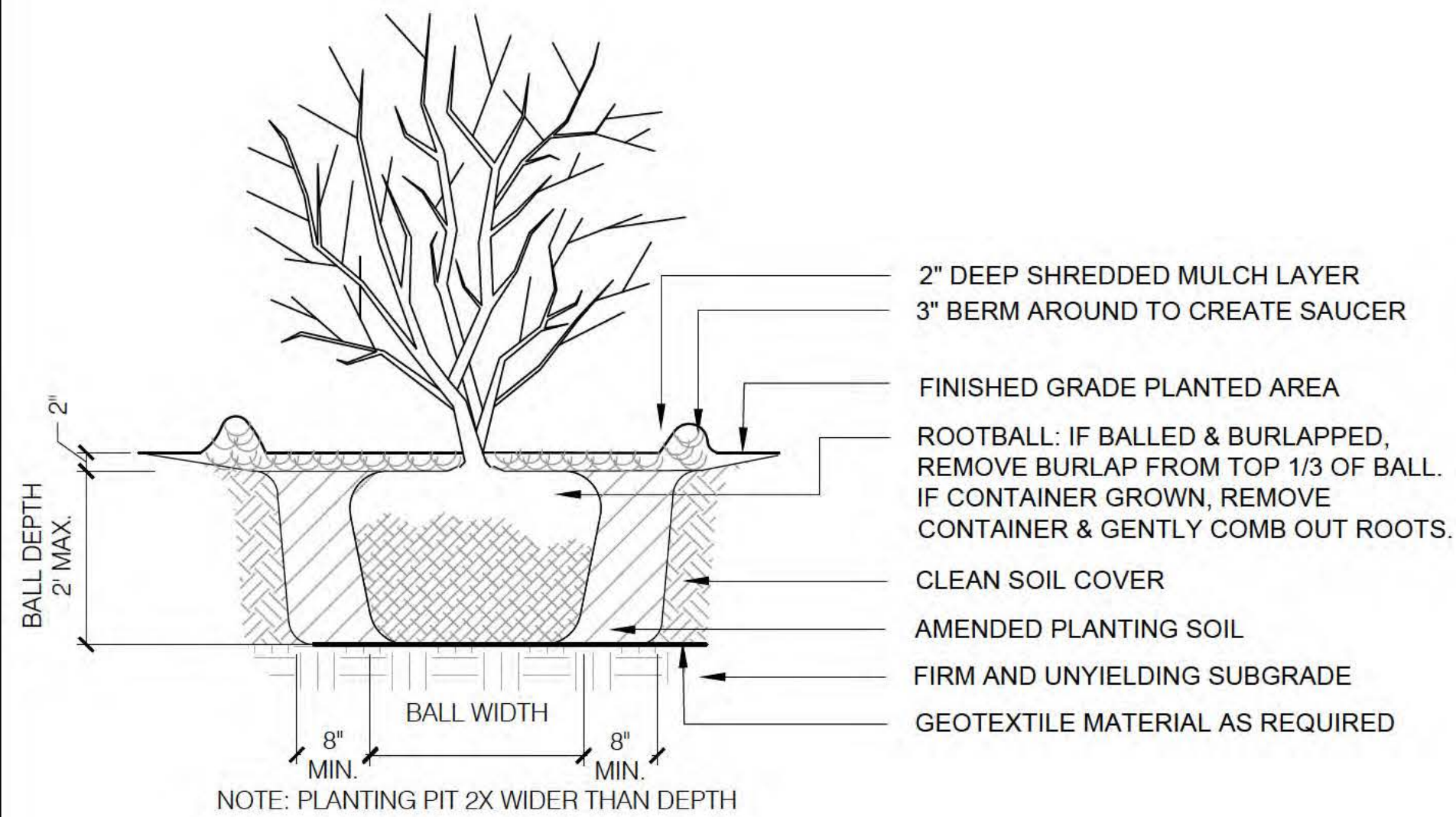
SHEET 11 OF 17



1 TREE PLANTING
SCALE: NTS



2 SHRUB AND HERBACEOUS PLANT SPACING
SCALE: NTS



3 SHRUB CONTAINER PLANTING
SCALE: NTS

GENERAL PLANTING NOTES:

- 1) Containerized shrubs will be planted as shown on plant schedule.
- 2) For containerized stock, all plants should be pre-inspected by the planting contractor to help ensure quality, proper hardening (2-week minimum), and species correctness. Any dead, dying, stressed, or badly "root-bound" plants will be rejected. Holes will be dug twice the width and equal to the depth of the root ball of the plant. Holes will be watered before planting, then filled, tamping down the soil to remove air pockets, and watered again immediately. Care should be taken to ensure that the installed containerized materials are not covered by mulch at the time of product application.
- 3) The seed should be applied through broadcast seeding, hand-raked to 1/4-to 1/4-inch depth to minimize seed loss, then surface-pressed through a water-filled press-wheel to facilitate good seed-to-soil contact. All seed must be labeled as 'certified' and should not include the presence of noxious or invasive species prohibited by the State of Rhode Island. All seed should be inspected prior to installation and all tags must be maintained for documentation by the resident engineer. Prior to delivery, seed should be processed by the seed provider on a "gravity-table" to remove non-target seed types and potentially invasive species. Seeding will only be performed between September 1 and when the ground freezes and when the ground thaws and June 1st.
- 4) No equipment will be allowed in the restoration area after seeding or planting.
- 5) Chemical and/or mechanical weed abatement should be facilitated by the client to assist in eradication of invasive and noxious weeds. The control of noxious and/or invasive species should be based upon site monitoring for a minimum of three-growing seasons following establishment. An iterative weed management plan should be implemented by the client based upon the results of monitoring.
- 6) Construction equipment, fuels, and other petroleum products shall not be stored or stockpiles with 50 feet of the creek or other aquatic habitats. Fueling should only occur within approved designated areas.

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Pawtucket, Rhode Island

DRAWING TITLE		REVISIONS		BY
PLANT DETAILS, NOTES, & SCHEDULE		NO.	DATE	

PROJECT NO.: 1701

DATE: FEBRUARY 2018

SCALE: AS NOTED

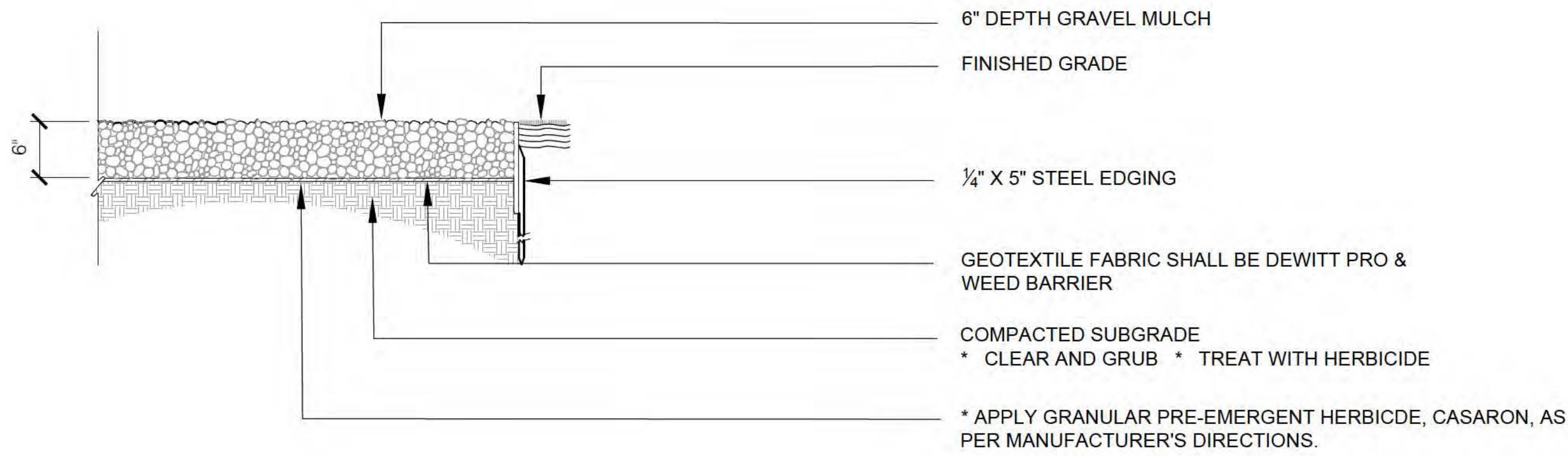
DRAWN BY: MK

CHECKED BY: LG

DRAWING NUMBER
RL-2

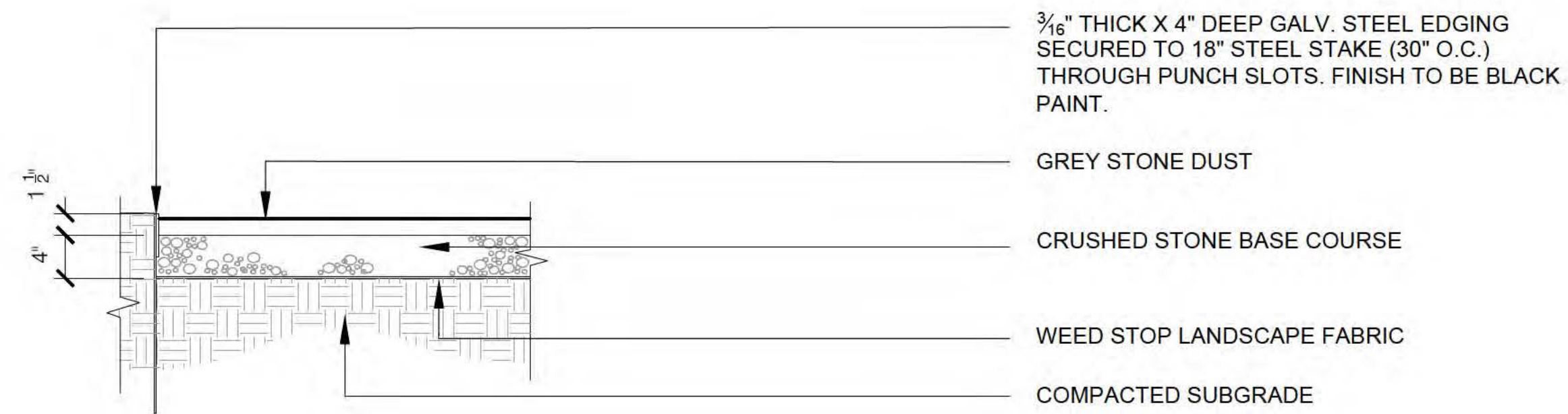
SHEET X OF X





1 PEA GRAVEL MULCH

SCALE: NTS



2 STONE DUST PATHWAY

SCALE: NTS

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Pawtucket, Rhode Island



DRAWING TITLE

SITE DETAILS

NO.	DATE	REVISIONS	BY

PROJECT NO.: 1701

DATE: FEBRUARY 2018

SCALE: AS NOTED

DRAWN BY: MK

CHECKED BY: LG

DRAWING NUMBER

RL-3

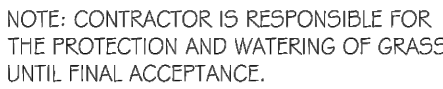
SHEET X OF X



NEW ENGLAND EROSION CONTROL/RESTORATION MIX FOR DETENTION BASINS AND MOIST SITES - SPEC SHEET (PDF)

THIS MIX IS PARTICULARLY APPROPRIATE FOR DETENTION BASINS THAT DO NOT HOLD STANDING WATER. MANY OF THE PLANTS IN THIS MIX CAN TOLERATE INFREQUENT INUNDATION, BUT NOT CONSTANT FLOODING. THE MIX MAY BE APPLIED BY HAND, BY MECHANICAL SPREADER, OR BY HYDRO-SEEDER. AFTER SOWING, LIGHTLY RAKE, ROLL OR CULTIPACK TO INSURE GOOD SEED TO SOIL CONTACT. BEST RESULTS ARE OBTAINED WITH A SPRING OR LATE SUMMER SEEDING. LATE FALL AND WINTER DORMANT SEEDING REQUIRES AN INCREASE IN THE APPLICATION RATE. A LIGHT MULCHING OF CLEAN, WEED-FREE STRAW IS RECOMMENDED.

SPECIES: RIVERBANK WILRYE (ELYMUS RIPARIUS), CREEPING RED FESCUE (FESTUCA RUBRA), LITTLE BLUESTEM (SCHIZACHYRIUM SCOPARIUM), BIG BLUESTEM (ANDROPOGON GERARDII), SWITCH GRASS (PANICUM VIRGATUM), UPLAND BENTGRASS (AGROSTIS PERENNANS), NODDING BURN MARIGOLD (BIDENS CERNUA), HOLLOW-STEM JOE PYE WEED (EUPATORIUM FISTULOSUM/EUTROCHICIUM FISTULOSUM), NEW ENGLAND ASTER (ASTER NOVAE-ANGLIAE), BONESET (EUPATORIUM PERFORLIATUM), BLUE VERVAIN (VERBENA HASTATA), SOFT RUSS (JUNCUS EFFUSUS), WOOL GRASS (SCIRPUS CYPERINUS).



E WILDFLOWER MIX

10% BLACKED EYED
SUSAN

THE SOIL SHOULD BE A UNIFORM MIX, FREE OF STONE, STUMPS, ROOTS OR OTHER SIMILAR OBJECTS LARGER THAN TWO INCHES. NO OTHER MATERIALS OR SUBSTANCES SHOULD BE MIXED OR DUPED WITH IN THE BIORETENTION AREA THAT MAY BE HARMFUL TO PLANT GROWTH, OR PROVE A HINDRANCE TO THE PLANTING OR MAINTENANCE OPERATIONS. THE BIORETENTION SOIL SHOULD BE FREE OF NOXIOUS WEEDS.

SAND: 85 - 88%
SOIL FINES: 8 TO 12% (NO MORE THAN 2% CLAY)
ORGANIC MATTER: 3 - 5%

A TEXTURAL ANALYSIS IS REQUIRED TO ENSURE THE BIORETENTION SOIL MEET THE SPECIFICATION LISTED ABOVE. THE BIORETENTION SOIL SHOULD ALSO BE TESTED FOR THE FOLLOWING CRITERIA:

PH RANGE	5.2 - 7.0
MAGNESIUM	NO TO EXCEED 32 PPM
PHOSPHORUS P_2O_5	NOT TO EXCEED 69 PPM
POTASSIUM K_2O	NOT TO EXCEED 78 PPM
SOLUBLE SALTS	NOT TO EXCEED 500 PPM

SINCE DIFFERENT LABS CALIBRATE THEIR TESTING EQUIPMENT DIFFERENTLY, ALL TESTING RESULTS SHOULD COME FROM THE SAME TESTING FACILITY.

SHOULD THE PH FALL OUT OF THE ACCEPTABLE RANGE, IT MAY BE MODIFIED (HIGHER) WITH LIME OR (LOWER) WITH IRON SULFATE PLUS SULFUR.

New England Conservation/Wildlife Mix

PRICE PER LB.	\$39.50	MIN. QUANTITY	2 LBS.	TOTAL:	\$79.00	APPLY: 25 LBS/ACRE :1750 sq ft/lb
---------------	---------	---------------	--------	--------	---------	-----------------------------------

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged. Price is \$/bulk pound, FOB warehouse, Plus SH and applicable taxes.

35% TURF TYPE TALL FESCUE
20% SMOOTH BROMEGRASS
30% CREEPING RED FESCUE
5% KENTUCKY BLUEGRASS
10% REDTOP